THE BACTERIOLOGY OF PEMPHIGUS NEONATORUM *

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There have occurred in and about Chicago within the last year 5 small epidemics of the disease commonly known as pemphigus neonatorum.

The first epidemic that was brought to my attention occurred at West Side Hospital in November, 1915. Only 3 cases developed, none of which was fatal.

The second epidemic, involving 5 babies and 1 nurse, occurred at the University hospital. There were no deaths.

The third epidemic occurred at the Cook county hospital in July, 45 cases appearing in the maternity ward. The first case occurred in the child of a woman who had been admitted with an impetigo of the skin around the mouth. Other cases rapidly developed, 2 of which terminated fatally. From cultures from several of these cases a staphylococcus was isolated which yielded a light-yellow growth on plain agar and was markedly hemolytic on plain blood agar. Smears from the vesicles revealed a kidney-shaped diplococcus, intracellular and extracellular, and a great preponderance of polymorphonuclear leukocytes in the fluids.

Several of the mothers developed lesions on the breasts and upper part of the body and one nurse developed a lesion. The ward had to be closed for over a month before the disease could be stamped out.

After this epidemic had developed, several women waiting for confinement at the county hospital were sent to the Monroe Street hospital. None of them was infected, either at the time of entrance into the Monroe Street hospital or subsequently. However, they transmitted the disease to about 9 children with whom they came in contact, all of whom were over 2 years of age. Nursing babies and bottle-fed babies in the same institutions, but not in contact with these women or infected children, remained free from the disease.

The fourth epidemic appeared at the Chicago Lying-In hospital, four babies being affected. There were no deaths. Staphylococcus aureus was found.

The fifth epidemic occurred at the Englewood hospital in September. There were 12 cases. Diplococci, intracellular and extracellular, were seen in smears from the vesicles. One baby died, but its death was said to have been due to causes other than pemphigus.

A peculiar epidemic of a disease the clinical description of which closely resembles that of pemphigus neonatorum occurred this summer in a camp for boys at Culver, Indiana. About 10% of 900 boys between the ages of 10 and 20 years were affected with a vesicular skin eruption, which was accompanied by no constitutional symptoms, and which, under white precipitate ointment, cleared up rapidly without scar-formation.

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Opinions differ concerning the pathologic significance of organisms found in the lesions of this disease. The staphylococcus and streptococcus have been declared by most writers to be the causative organism.

Demme[1] (1886) was the first to cultivate an organism from a case of acute contagious pemphigus. This was a nonchromogenic diplococcus.

Almquist[2] in 1891 isolated an organism from a series of cases of pemphigus neonatorum, which was a diplococcus when studied in the serum of the vesicles of the disease, but which closely resembled Staphylococcus aureus when grown on artificial media. When inoculated into the human skin, however, it showed no tendency to produce the deep infection or carbuncle characteristic of Staphylococcus-aureus infection, but produced the vesicular eruption typical of pemphigus neonatorum. He concluded therefore, that in spite of its close resemblance to the staphylococcus in cultural characteristics, it was a different organism, and he suggested the name Micrococcus pemphigi neonatorum.

Matzenauer,[3] after histologic and bacteriologic examination of both impetigo contagiosa and pemphigus neonatorum, concluded that they were identical. He believed that the organisms which he had isolated were indistinguishable from Staphylococcus aureus.

In 1900 Sabouraud[4] divided the cases of this disease into 2 main divisions or classes—the vesicular type of Tillbury Fox, and the pustular type of Bochart. He based his conclusions more especially on his bacteriologic observations with a special technic. He classified the cases of pemphigus neonatorum as of the vesicular variety and asserted that they are due to a streptococcus. Later the lesions, in his opinion, become secondarily infected with a staphylococcus, which has been wrongly supposed by most investigators to be the cause of the disease. In practically all cases in which the streptococcus was isolated, ascitic fluid had been used as the culture medium, and for cultures the contents of the vesicles had been obtained in the early stages of their development. He lays great stress on the cultural value of the liquid media. He obtained a mixture of staphylococci and streptococci when he used ascitic fluid and broth in equal parts. With plain broth he found the staphylococcus in almost pure culture. On solid media he invariably obtained the staphylococcus. These results he explains on the ground that the initial lesions of the disease are due to infection with the streptococcus, emphasizing the rapidity of incidence of the lesions as a point in favor of his view. Some hours or days subsequent to the initial infection the lesion becomes infected with the staphylococcus which in the later stages is found in pure growth in the lesions.

There are several points about the work of Sabouraud which need further elaboration before his views can obtain recognition. In the first place, he did not reproduce the lesions by the injection into other patients of cultures of the streptococcus. Secondly, as he himself points out, the media that he used for growing the streptococcus has an inhibiting action on the staphylococcus. In cases in which a culture medium was used which was favorable to both organisms, he always obtained a more luxuriant growth of the staphylococcus. This organism, moreover, was always present together with the streptococcus in smears from the lesions. It is difficult to see how Sabouraud can advance as the etiologic agent of a disease an organism that

[1] Verhandl. d. Cong. f. inn. Med., Wiesbaden, 1886.
[2] Ztschr. f. Hyg. u. Infektionskrankh., 1891, 10, p. 253.
[3] Virchow-Hirsch Jahrb. d. ges. Med., 1900, 25, p. 549.
[4] Sabouraud, Ann. de dermat. et de syph., 1900, 31, p. 325.

has fulfilled but one of Koch's laws. Granting that a streptococcus may be present early in these cases, the fact that the staphylococcus is also present renders quite unwarranted any conclusions from this fact alone, as to which of the two is the primary and which the secondary invader. Furthermore, the fact that the staphylococcus found in connection with this disease fulfills all of Koch's laws, indicates that this organism is the cause of the disease. Finally, Sabouraud gives no description of the cultural characteristics of the streptococci. Inasmuch as staphylococci may under certain circumstances appear in short-chain formation, this point should be elucidated.

Block[5] in 1900 described 15 fatal cases, giving good pathologic reports. He found a streptococcus in the heart blood in several cases, but believed it to be a secondary invader. In the skin lesions he found Staphylococcus albus and Staphylococcus aureus, and a coffee-bean-shaped diplococcus.

Clegg and Wherry[6] in 1906 isolated from cases of pemphigus neonatorum occurring in the Civil hospital at Manila, a diplococcus corresponding to those described by Almquist, and closely resembling Staphylococcus aureus on culture media, but showing some features which they considered distinctive. They found in addition to Almquist's findings that litmus milk was coagulated in about a week. No indol was produced or cholera red in Dunham's broth containing 0.01% KNO_3, after 10 days. In a 1% glucose broth solution containing ⅓ part sterile goat serum, growth appeared with remarkable rapidity, a tube being densely clouded, while control tubes, inoculated with Staphylococcus aureus and Sarcina lutea, showed only a faint growth. With the formation of acid the serum was precipitated as a dense flocculent mass. No gas was found in 1% glucose, lactose, and saccharose broth; cloudiness appeared in both open and closed arms of the fermentation tubes.

Morphologically the organisms in preparations of agar and broth were indistinguishable from pyogenic staphylococci. In media prepared from milk, or better, serum broth, the diplococcic arrangement found in smears from the vesicle contents was well reproduced. Chromogenic characteristics were better brought out on gelatin and glucose agar than on plain agar. One cubic centimeter of a 48-hour broth culture injected into a guinea-pig intraperitoneally, caused no reaction in 1 week. Small amounts of the same serum broth culture injected under the skin of a rabbit gave rise to no vesicles and caused only small hyperemic areas, which disappeared in a week. Self-inoculation on the forearm of one of the investigators gave a typical lesion in 30 hours, but the organism was not recovered. There was no subjective sensation, except a slight itching, and resolution occurred in 48 hours without scar-formation.

Max Neisser[7] considers Almquist's organism a strain of the staphylococcus. The organism corresponds exactly with the description given by Neisser of typical Staphylococcus aureus. However, he reports no work with Almquist's organism in support of his contention.

The epidemic of pemphigus neonatorum which I have investigated occurred at the University hospital, Chicago, in February, 1916.

There had been no previous cases in the practice of any of the members of the obstetrical staff. There had been an epidemic at West

[5] Brit. Jour. Dermat., 1900, 12, p. 304.
[6] Jour. Infect. Dis., 1906, 3, p. 165.
[7] Kolle and Wassermann's Handb. d. pathogen. Mikroorganismen, 1912, 4, p. 389.

Side Hospital, distant one block, a few months before the outbreak in question, but since the attending and nursing staffs of the two institutions are entirely distinct, no avenue of communication from that source could be traced. As far as could be ascertained no cases of inpetigo contagiosa had been treated in the hospital immediately preceding the outbreak of the epidemic. Midwives are not allowed in the hospital, but as the greater number of obstetrical cases in the University hospital are Russian Jews living in the Ghetto, the possibility of an examination of patients by midwives previous to their entry to the hospital cannot be denied, altho no history to that effect could be elicited.

None of the mothers of the babies was suffering from leukorrhea, and none ran a temperature during the puerperium. There were 6 cases altogether and a description of one typical case will suffice for all.

The eruption appeared on the 8th day on the flexor surface of the left arm at the bend of the elbow. The initial lesion was a macula, which enlarged by peripheral extension and became pale in the center. Soon the skin began to rise in the center of the lesion, forming a minute vesicle with a peripheral ring of hyperemia. The epidermal covering of the lesion was very thin and transparent. The fluid contents were clear, but later became turbid as the lesion developed into a bulla. The lesion spread with remarkable rapidity in an excentric manner, so that in 24 hours it was as large as a dollar, and answered in every respect the description of the smaller vesicle which preceded it. As the lesion enlarged the fluid contents became turbid, and the thin epidermal covering was wrinkled and flaccid. Other vesicles of a similar character rapidly appeared on various parts of the body, especially on the arms and thighs. Rupture of the vesicles and bullae occurred at various stages of their development, disclosing a hyperemic base, moist and glistening. In some instances the vesicles spread peripherally after the rupture. They usually, however, tended to remain stationary or to heal rapidly subsequent to rupture. There were no general manifestations of the disease. The children nursed well and ran no temperature. The leukocyte count was slightly raised, averaging 15,000 white corpuscles, with red corpuscles normal. A differential count was unfortunately not made.

Cultures were made both aerobically and anaerobically on blood-agar media and growth was obtained in both cases, but the organism grew much more luxuriantly under aerobic conditions. Anaerobic and aerobic transplants to plain agar resulted in the same luxuriant aerobic and faint anaerobic growth as was seen in the original cultures.

The attempts that have been made to inoculate this organism into animals with a view to reproducing the disease have been uniformly unsuccessful. Rabbits and guinea-pigs have been used, and subcutaneous, intradermal, and intraperitoneal injections have been reported

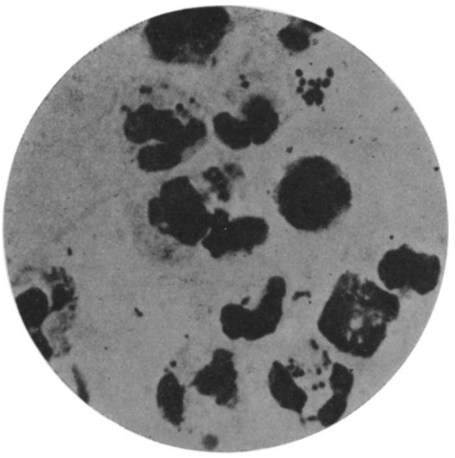

Fig. 1. Smear from vesicle before rupture, showing preponderance of polymorphonuclear leukocytes and intracellular and extracellular diplococci. One short chain is also seen. Methylene blue stain. × 1200.

by Clegg and Wherry, who report negative results except for hyperemia at the site of some of the subcutaneous injections. However, they used relatively small doses (1 c.c. of 48-hour broth cultures), and they do not mention how long the organism had been cultivated on artificial media before it was used in the animal experiment. Since this organism apparently had been the cause of death in children affected with the disease, I determined to make further tests of its pathogenicity in lower animals. In the first experiment a rather large dose was employed intraperitoneally to determine roughly its virulence.

A 24-hour blood-agar slant culture in 5 c.c. of sterile normal salt solution was injected intraperitoneally into a half-grown guinea-pig. The animal remained perfectly well for 3 days; then an edematous tender swelling occurred over the lower abdomen. The animal refused to eat, and death occurred the next day. There was marked edema of the subcutaneous tissues and skin with hemorrhages into the skin and underlying muscles of the abdominal walls. This condition was most marked at the site of the injection, and spread around to the back and down both hind legs.

Adhesions and subperitoneal hemorrhages were noted on opening the peritoneal cavity. There was an abscess the size of a split pea in the spleen, with perisplenic adhesions, and an ulcer 2 mm. in diameter at the pylorus of the stomach. The liver and kidneys were normal; the gallbladder was distended. There was an hemorrhagic infarct of the right lung. Heart and pericardium were normal.

Cultures from the skin, muscles, and heart blood were made on blood agar and the causative organism recovered in pure growth in all cases.

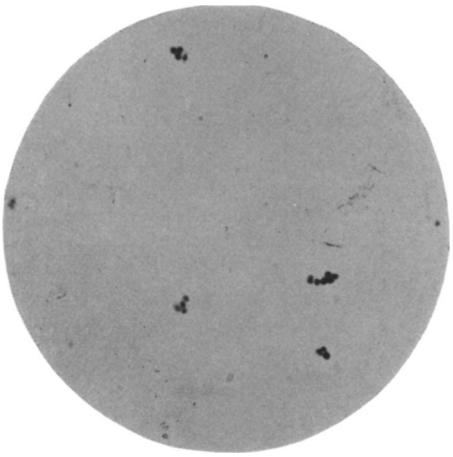

Fig. 2. Smear from a 48-hour broth culture. One short chain is shown and the tendency toward staphylococcic clumping. Some of the diplococci are kidney-shaped. Gram stain. × 1200.

It was thought that by intravenous injection the elective affinity of the organism for the skin might be demonstrated.

A half-grown rabbit was injected intravenously with 2 c.c. of a heavy suspension of the organism in salt solution. The animal appeared sick the next day and did not eat. It developed diarrhea, and died on the 3rd day. Autopsy revealed an abscess of the kidneys, an ulcer, 1 cm. in diameter, at the pylorus of the stomach, pneumonia in both lungs, acute cholecystitis, hematorachis of bright blood underneath the pia. There were no metastatic skin lesions.

Because of the nature of the organism and because of its tendency in most human cases to remain localized in the skin, tho capable of causing severe manifestations and death on gaining access to the blood stream, it was determined to inject some animals subcutaneously and some intraperitoneally to determine whether there were differences in behavior under the given conditions. As the infection runs a more severe course in children than in adults, young guinea-pigs were used as lending themselves more favorably to the conditions of the experiments.

In all cases 1 c.c. of a heavy suspension of organisms grown on blood agar for 24 hours was used intraperitoneally for injection. These organisms had been isolated from the lesions in patients 6 days previously and had been grown on blood agar in the interval.

SERIES 1

Guinea-pig 1.—Died the next day. Autopsy: Peritonitis, cholecystitis, perisplenitis, and salpingometritis. Heart, lungs, spleen, liver, and kidneys

normal. Cultures from the peritoneal cavity and the heart blood gave, from the former, a luxuriant growth of staphylococcus in pure culture in 24 hours, and from the latter, a few colonies of the same organism.

Guinea-pig 2.—Appeared well for 4 days following the injection; then there developed paresis of both hind legs, more marked on the right side. Animal could move them somewhat when painful stimuli were applied. Paresis increased. Death 15 days after inoculation. No clinical evidence of peritonitis. Autopsy: Broncho-pneumonia in both lungs with adhesive pleuritis, adhesions in the peritoneal cavity, and evidence of recent peritonitis, no skin abscesses found. Spinal cord showed rather extensive subpial hemorrhages near the cauda.

Guinea-pig 3.—No symptoms until 5 days later when a tender edematous swelling appeared on the under surface of the abdomen and the animal seemed

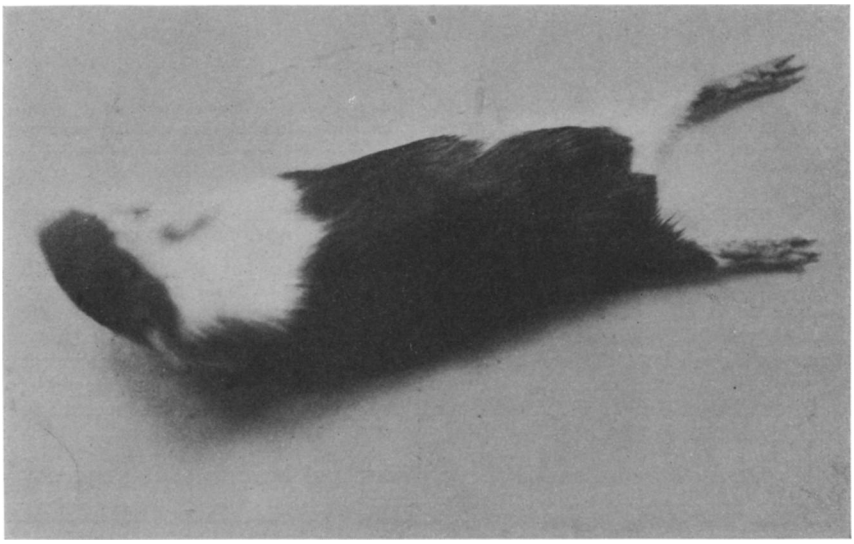

Fig. 3. Guinea-pig showing paralysis of hind legs, which developed 4 days after an intraperitoneal injection of 1 c.c. of a heavy suspension of the organism grown on blood agar for 24 hours.

ill. Death 15 days later without any change in the clinical picture. Autopsy: Generalized peritonitis, lobular pneumonia, and acute nephritis. Liver, spleen, gallbladder, and heart normal. No skin lesions.

Cultures from the heart blood and the peritoneum revealed the organism injected.

SERIES 2

Guinea-pig 1.—Appeared sick and died in 7 days. Autopsy: Marked edema and cellulitis at the site of injection, and local peritonitis just under the skin lesion. Adhesive peritonitis appeared about the stomach, pancreas and spleen. Small amount of clear serous fluid in the peritoneal cavity. No skin lesions except at the site of injection. Cultures from heart blood and peri-

cardium on blood agar yielded the organism injected in luxuriant growth. Skin culture negative.

Guinea-pig 2.—Gradually sickened and was found dead in 7 days. Autopsy: Abscess on right side and enlarged subcutaneous lymphatic glands near the inguinal ring on the same side. The abscess was 1 cm. across, with ulcerations of the skin and formation of bright-yellow pus. Peritonitis below the abscess on the right side, with adhesions to the ileum; no generalized peritonitis. Pneumonia of right lower lobe. Heart, liver, spleen, and kidneys normal.

From these experiments it will be seen that the organism in question is virulent, producing severe lesions and death in guinea-pigs and rabbits. Even in the cases in which subcutaneous injections were made, the tendency to invasion of the deeper tissues and to systemic infection is clearly seen in positive peritoneal and blood cultures. In Series 2 particular pains were taken to avoid injecting any bacteria into the peritoneal cavity. There was no tendency of the organisms to localize in the skin in any of the experiments. This speaks strongly for the view that the disease is an infection by contact with contaminated material and not a systemic infection in the early stages of the disease, as has been suggested by many authors.

The peculiar tendency toward hemorrhages into the spinal cord and paralysis or paresis in some of the animals is worthy of note. Further experiments are in progress to determine whether this is a frequent feature, or merely accidental in these cases.

Because of repeated failures of many observers to produce lesions in rabbits and guinea-pigs by intracutaneous injections an attempt was made to reproduce the lesion in a monkey.

A young Macacus rhesus monkey not being obtainable, a young Java monkey was inoculated intradermally. A drop of a 24-hour broth culture was placed on the tender skin of the inner surface of the upper arm after cleansing with 95% alcohol. Then, with a rather coarse needle, the skin was pierced through the drop in such way that the needle ran almost parallel to the skin surface and just raised the epidermis, without penetrating the dermis. An abortive vesicle resulted in 48 hours, which after 72 hours was excised and sectioned. The sections showed an elevation of the epidermal layer and some leukocytic infiltration of the underlying base. The whole lesion was abortive in type, measuring not more than 2 mm. in diameter. There was no erythematous areola as seen in lesions in human cases. A control inoculation with the sterile needle made in the same way was negative.

Reports of auto-inoculation experiments have been made by Almquist and by Clegg and Wherry. The typical lesions were reproduced in each case, but in neither of these experiments was an attempt made to recover the organism from the lesion. It was in an endeavor to do

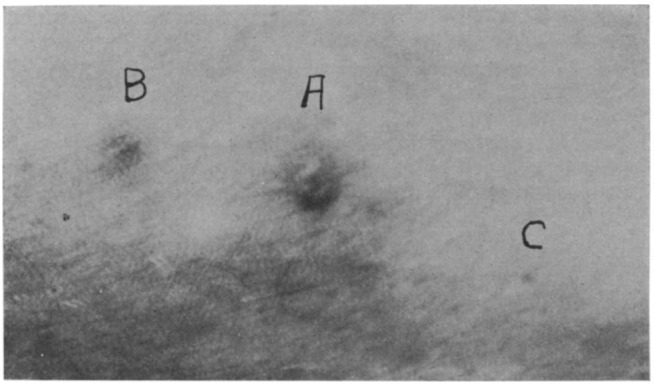

Fig. 4. *A* indicates a typical lesion on flexor surface of the forearm produced 36 hours after intracutaneous auto-inoculation. Note the darkened area surrounding the vesicle, denoting the hyperemic aureola, and also the characteristic wrinkling of the covering of the lesion. *B* indicates the hyperemic area just preceding the development of the vesicle at that point. *C* indicates the site of the control inoculation with sterile needle.

this and thus fulfill Koch's postulates with regard to this organism that the writer decided to inoculate himself.

The flexor surface of the left forearm was carefully scrubbed with 95% alcohol and most of the superficial epidermis was removed with the object of getting rid of staphylococci present on the skin surface.

A 24-hour culture in Dunham's peptone solution was used which had been inoculated from a Loeffler's serum culture after the organism had been on artificial medium for 3 weeks. One drop of the peptone solution was placed on the cleaned flexor surface of the forearm and a slight prick was made through the skin and down to the corium. The needle was withdrawn through the drop, and without sterilizing was inserted into the skin in a similar manner about 4 cm. away from the site of the primary injection. A control inoculation was made with sterilized needle about 4 cm. from the second inoculation.

After 4 hours, and again after 8 hours, nothing was noted at the site of inoculation. In 15 hours an erythematous area, 0.5 cm. in diameter, appeared at the site of the second inoculation, and in 20 hours a distinct vesicle appeared. It was the size of a pea, yellowish in color, with a very thin, wrinkled covering of epidermis, which was transparent. The vesicle was surrounded by an area of hyperemia about 3 mm. wide. The site of the primary inoculation had become red and hyperemic at this time, but no vesicle had appeared. The control inoculation was negative.

After 36 hours the first vesicle had increased in size to 7 mm. and the yellowish fluid contents had become turbid. The covering was more wrinkled and less tense than formerly. At this time the second vesicle was beginning to form on the hyperemic area at the site of the primary inoculation.

In 48 hours the first began to decrease in size, altho it had not yet ruptured. The second had increased to 5 mm. in diameter, and rested on an areola 2.5 cm. in diameter. It answered in all respects the description of the primary vesicle. The control remained negative. There were no subjective sensa-

tions. A blood count made at 48 hours showed 9000 white cells. A differential count gave 58% polymorphonuclear neutrophiles, 13% large mononuclear, and 27% small mononuclear leukocytes, 1% eosinophiles, and 1% basophiles, 200 cells being counted.

At 48 hours the tops of both vesicles were removed and cultures made from each on Loeffler's medium by means of a platinum loop. Some of the fluid contents of the vesicles were taken up by means of a capillary tube and smears made from this. The culture from the first vesicle, which, as mentioned, was beginning to undergo retrogression, was sterile. Cultures from the second, which was at the height of development, yielded a good growth of the organism injected.

Smears from the vesicles showed intracellular and extracellular diplococci, which were gram-positive, and morphologically resembled the kidney-shaped diplococcus described by Almquist. A differential count of the white cells in the vesicle contents revealed a high percentage of lymphocytes. This is the opposite of what Almquist found in the lesions of babies; namely, predominance at this time, of polymorphonuclear leukocytes.

Following the removal of the thin transparent covering of the lesion, the base was very hyperemic, reddened, moist, and glistening. It was tender to the touch and smarted when alcohol was applied. The edges were even and round. On the 4th day after inoculation the areola had disappeared, and the bases of the lesions were a deeper red. There was a slight tendency to the reformation of the vesicle at the edges of the lesion and to further peripheral extension. There were no subjective sensations.

A large scale came from the first lesion on the 7th day, and from the second vesicle on the 10th day after inoculation, leaving a shiny smooth base, which in a week was indistinguishable from the surrounding integument.

Reports in the literature of control experiments with Staphylococcus aureus are numerous. Thus Garré[8] rubbed a pure culture on the uninjured skin of his arm and in 4 days developed a large carbuncle with a surrounding zone of furuncles. An even more analogous experiment was that of Bockhart[9] who suspended a small portion of an agar-agar culture in sterile salt solution, and scratched the suspension gently into the deeper layers of the skin with the finger nail. A furuncle developed at the site of inoculation.

Culturally, the organism from pemphigus neonatorum cannot be distinguished from many strains of staphylococcus. Its reactions on the various media are given in the accompanying tables, together with its fermentation reactions and its ability to produce acid in sugar solutions.

As to the thermal death point, this organism closely resembled the other strains of Staphylococcus aureus. Agar tubes were inoculated and kept at 60, 65, 70, 75, and 80 C. for 10, 20, and 30 minutes. The organism was able to withstand 60 C. for one-half hour, but 65 C. for 10 minutes killed all but an occasional organism.

[8] Fortschr. d. Med., 1885, 3, p. 165.

[9] Monatsh. f. prakt. Dermat., 1887, 4, p. 450.

On plain-blood-agar plates the organism was strongly hemolytic. The colonies appeared gray and semitranslucent, and did not become pigmented.

This strain produced indol, as do other strains of the staphylo-

TABLE 1

CULTURAL CHARACTERISTICS OF THE ORGANISM FROM PEMIPHIGUS NEONATORUM

Media	24 Hours	48 Hours	72 Hours	1 Week
Plain agar...	Moderate growth; slightly spreading and raised at edges, glistening, smooth, translucent; no odor, discoloration, or pigment	Slight yellow pigment	More pigment	Pigment fairly well marked; faint musty odor
Plain broth..	Diffuse turbidity, some deposit	Increased turbidity, more gray deposit	Same.....	Dense turbidity, moderate yellowish deposit
Litmus milk	Less alkaline.....	Less alkaline....	Less alkaline..	Acid; no coagulation; blue precipitate at bottom
Gelatin.....	Faint cup-shaped depression	Marked depression	More liquefaction	Liquefaction almost complete
Potato.....	Scant, slightly raised, confined to streaks, faintly butyrous; faint musty odor	More growth, more pigment, media slightly darkened	More growth, media discolored	Strong yellow pigment; media darkened
Loeffler's blood serum	Beaded at edge, deep-yellow, slightly raised, glistening, butyrous; faint musty odor	Same.....	Same.....	Same
Russell media	Top layer reddish, intermediate layer yellowish, deep layer blue and red	Same changes but more marked	Completely acid	No change
Levulose.....	Good stab growth, slight surface growth	Increased surface growth	Same.....	Light-yellow, moderate surface growth
Lactose.....	Good stab, poor surface growth	Increased surface growth	Same.....	Light-yellow surface, good stab growth
Inulin.....	Good stab, fair surface growth	Increased surface growth	Same.....	Luxuriant surface growth, orange-yellow, gray at edges
Salicin.....	Slight surface, good stab growth	Increased surface growth	Same.....	Luxuriant surface, moderate stab growth, orange-yellow
Raffinose.....	Slight surface, good stab growth	Increased surface growth	Same.....	Luxuriant surface growth, orange-yellow; moderate stab growth

coccus. It differs in this respect from the organism described by Clegg and Wherry.

From these data it would appear that the causative organism of this disease is one that culturally and biologically is identical with the staphylococcus. Morphologically, on certain media it differs slightly

in that it appears as a diplococcus and occasionally forms chains. Pathologically, it differs in that it produces a lesion that is peculiar to this type of infection.

These differences do not seem sufficient for considering the pemphigus coccus as a different species. It would seem more correct to regard it as a strain of the staphylococcus with certain peculiarities as to cultural and pathogenic properties which differentiate it from other strains of the same organism.

The name pemphigus neonatorum is an unfortunate one for this disease. True pemphigus has been looked on as a severe constitutional disease, attacking principally older people, and as a disease in which a serious prognosis is usually made. The etiology is obscure in the

TABLE 2

SUGAR-FERMENTATION AFTER 3 DAYS

Sugar	Growth in Fermentation Tubes		Gas		Percentage of Acid Formed
	Open Arm	Closed Arm	24 hr.	48 hr.	
Lactose	++	++	0	0	.8
Saccharose	++	++	0	0	.875
Maltose	+++	+++	0	0	.85
Dextrose	++	0	0	0	.80
Mannite	+	+	0	0	.75
Raffinose	+	+	0	0	.50
Inulin	+	0	0	0	.45
Salicin	+	0	0	0	.40
Control	0	0	0	0	.40

Phenolphthalein used as indicator.
N/10 NaOH used for titration.

extreme, no causative organism having thus far been described. In pemphigus neonatorum we are concerned with an entirely different type of disease. There are few or no constitutional disturbances, the infection being limited to the skin, and the causative organism has been isolated in pure culture, and fulfills Koch's laws. It would therefore seem advisable to classify this disease pathologically under a different heading; namely, dermatitis. I suggest that the name epidemic staphylococcic vesicular dermatitis of the newborn, be applied to the disease.

SUMMARY

Pemphigus neonatorum is a peculiar type of staphylococcic dermatitis occurring in the newborn, but capable of transmission to adults.

The causative organism is a strain of Staphylococcus aureus, indistinguishable culturally and biologically from some other strains of

staphylococcus, but differing under certain circumstances morphologically, and showing different pathogenic tendencies.

This organism has fulfilled all of Koch's laws with respect to the disease. Typical lesions from which the organism has been recovered have been produced in man. It is pathogenic for lower animals, but injections have thus far failed to reproduce the specific disease.

The epidemic nature and possibly fatal termination of the disease make its early recognition and active treatment highly desirable.

In view of the clinical and experimental data it appears that the infection spreads by contact with infected material and that the portal of entry is the intact skin.

In keeping with its etiology and pathology, the name epidemic staphylococcic vesicular dermatitis of the newborn is suggested for this disease.